



United States Senate

May 9, 2019

Senator Anthony J. Portantino
Chair, Appropriations Committee
State Capitol, Room 3086
Sacramento, CA 95814

Dear Senator Portantino:

Thank you for your co-sponsorship of California State Senate Bill 307 (SB 307). I understand this bill is before the Appropriations Committee next week, and I write to express my strong support for it.

As you know, this important legislation would enhance protections for California's desert by ensuring any future water transfers from groundwater basins underlying desert lands do not adversely affect the desert's natural or cultural resources.

The Cadiz water extraction proposal illustrates why state protections of desert groundwater basins are so critical at this time. Cadiz, Inc., a private company that owns approximately 45,000 acres in the Mojave Desert, wants to exploit the aquifer underneath the land it owns and the adjacent desert. It proposes to extract these limited water resources at withdrawal rates that would decimate the aquifer, and in turn, the desert. Enhanced state review is already in place for other treasured places in California, such as Lake Tahoe, San Francisco Bay and the California coastline. I strongly believe that California's iconic desert merits the similar enhanced state review that SB 307 would provide.

I met with Cadiz about its project in 1999, and I left with serious concerns about the project's potential impact on the desert. With Cadiz's knowledge, I asked the United States Geological Survey, an independent scientific federal agency, to provide an objective assessment of the natural recharge rate of the project's targeted groundwater basins. I have attached letters from the United States Geological Survey and the National Park Service dating back to 2002 explaining their independent scientific assessments of the groundwater recharge potential of the region and summarized their findings below:

- January 15, 2002: The U.S. Geological Survey estimates the aquifer recharge rate is "less than 5,000 acre feet per year."

- February 13, 2012: National Park Service comments on the Cadiz Draft Environmental Impact Report state the groundwater recharge in the basin ranges from 4,650 to 7,750 acre feet per year “at best.” These comments also state that Cadiz’s estimates “are not reasonable and should not even be considered” and are “3 to 16 times too high.”
- May 5, 2017: USGS reconfirms its 2002 estimates stating there is “no new information that would change our recharge estimates.”

Cadiz chose to disregard these objective scientific analyses from the United States Geological Survey and the National Park Service about how devastating its proposal would be to the desert and its wildlife, as well as to local communities and industries. Instead, Cadiz continues to assert that the recharge rate for the target aquifer is 32,000 acre feet per year and proposes to extract an average of 50,000 acre feet of groundwater, or 16 billion gallons a year, from the region each year over a 50-year period.

Now, with support within the current federal Administration, Cadiz is trying to push its project forward. In September 2017, the Trump administration reversed previous Bureau of Land Management policy in order to allow the Cadiz water extraction project to proceed without requiring any federal land permits.

However, based on new scientific studies and state land ownership in the project footprint, California state agencies are questioning Cadiz’s project proposal.

For example, a recent peer-reviewed scientific study illustrates how Cadiz is incorrect in its assumption that the target aquifer is disconnected to vital desert springs. In its 2012 CEQA comment letter, the National Park Service raised this issue, calling it “inappropriate to conclude ‘a priori’ that all springs in the watershed area are hydraulically disconnected with the target aquifer.”

A new 2018 springs study, along with others, prompted the California Department of Fish and Wildlife to state in a December 2018 letter to Cadiz (attached) that the project “may pose a substantially higher risk to the spring and desert bighorn sheep than the Project EIR disclosed” and that “further analysis and environmental review of these important issues will be necessary.”

I believe SB 307 is key to ensuring desert groundwater basins are not harmfully exploited by creating a commonsense state review process that safeguards California’s fragile desert lands and groundwater basins. A healthy, vibrant California desert supports

its surrounding local communities' economies. According to the National Park Service, nearly three million visitors to Joshua Tree National Park had a cumulative benefit to the local economy of \$182,717,500 and supported 1,789 jobs in 2017 alone.

I am determined to continue fighting for the desert, and I greatly appreciate your help in those efforts. Please do not hesitate to contact me, or my staff, if there is anything I can do to assist. I thank you for the opportunity to support SB 307, and I hope you will help me ensure it passes the State Legislature this year.

Sincerely,



Dianne Feinstein
United States Senator

Enclosures: Letter from USGS dated May 5, 2017
Letter from National Park Service dated February 13, 2012
Letter from USGS dated January 15, 2002
Letter from CA Dept. of Fish and Wildlife December 4, 2018

DF:as



United States Department of the Interior

U.S. GEOLOGICAL SURVEY

Office of the Director

Reston, Virginia 20192

MAY 5 2017

In Reply Refer To:
Mail Stop 100
GS17000743

The Honorable Diane Feinstein
United States Senate
Washington, DC 20510

Dear Senator Feinstein:

Thank you for your letter of April 7, 2017, regarding the Cadiz water extraction project. Because of its long history of hydrologic studies in southern California, the U.S. Geological Survey (USGS) was asked by the Bureau of Land Management (BLM) to review the original Cadiz Groundwater Storage and Dry-Year Supply Program (Cadiz Project) Draft Environmental Planning Technical Report (Draft Report). We delivered this review to the BLM on February 23, 2000. We received a letter from your office on December 21, 2001, regarding concerns about the Cadiz Project and responded on January 15, 2002.

In the February 2000 review of the Cadiz Project's Draft Report, the USGS evaluated the groundwater and surface-water models, water-balance analyses, chloride mass-balance calculations, and isotopic age-dating of the groundwater. As part of the review, the USGS calculated estimates of natural recharge to the Fenner, Bristol, and Cadiz basins, which ranged from approximately 2,000 to 10,000 acre-feet per year.

In October 2016, USGS researchers spoke with your staff summarizing the results of the 2000 review and reaffirming the 2000 analysis of natural recharge. We are not aware of new information that would change our recharge estimates. However, as we also indicated, we have not reviewed the current proposed Cadiz water extraction project. Similarly, we have not conducted new site-specific studies or data collection in the Cadiz area since our 2000 review. Updating our 2000 estimate of recharge in the Cadiz area would be a significant undertaking requiring a detailed review of new studies since then, along with new data collection, analyses, and modeling. Currently, the USGS does not have sufficient resources available to take on a substantial new project in the Cadiz area.

I understand that there may be more recent non-USGS studies of the area that project a higher recharge rate. Given the opportunity, we would be pleased to provide you with our scientific evaluation of those studies.

The Honorable Diane Feinstein

2

Thank you again for your inquiry. We greatly appreciate your long-standing support of USGS science. If you or your staff would like more information on this topic, please contact Mark Sogge, USGS Pacific Region Director based in Sacramento at mark_sogge@usgs.gov or 916-278-9551.

Sincerely,

A handwritten signature in cursive script, appearing to read "William H. Werkheiser".

William H. Werkheiser
Acting Director



United States Department of the Interior

NATIONAL PARK SERVICE
Mojave National Preserve
2701 Barstow Road
Barstow, CA 92311



IN REPLY REFER TO:
L7621 (MOJA)

February 13, 2012

Tom Barnes, ESA
626 Wilshire Blvd., Suite 1100
Los Angeles, CA 90017

Re: *National Park Service Comments to Draft Environmental Impact Report for the Cadiz Valley Water Conservation, Recovery and Storage Project.*

Dear Mr. Barnes:

By Notice of Availability (NOA) dated December 5, 2011, the Santa Margarita Water District (SMWD), as the Lead Agency, informed interested parties that it had prepared a Draft Environmental Impact Report (Draft EIR) pursuant to the California Environmental Quality Act (CEQA) for the *Cadiz Valley Water Conservation, Recovery, and Storage Project* (Project), and invited comments on the Draft EIR to be submitted by February 13, 2012. The SMWD, along with other participating water agencies acting as Responsible Agencies, is proposing to implement the Project in partnership with Cadiz Inc. (Cadiz), which owns approximately 34,000 acres of land located in the Cadiz and Fenner Valleys of San Bernardino County, and the Fenner Mutual Water Company (FMWC), a non-profit California mutual water company formed to deliver water at cost to its shareholders that are public water systems who will purchase water from the Project.

The following letter and attachments constitute the complete set of comments of the National Park Service (NPS) and the Mojave National Preserve (Preserve). A brief summary is provided below of the NPS's main issues and concerns with this document as it moves forward in the CEQA process toward a Record of Decision. Most of the NPS's concerns center on the sustainability of the Project. Consolidated general and specific comments provided on the attached comment forms describe these main issues and concerns, as well as others, in more detail.

ISSUE #1: Most of the non-Project related groundwater recharge studies conducted in the study area indicate that natural recharge to the Fenner and Bristol Valleys likely ranges from 2,000 to 10,000 acre-feet per year and that the Project's recharge estimate is 3 to 16 times too high. Given the amount of recoverable groundwater that the Project is seeking to extract from these two watersheds, the NPS is concerned that the proponent is substantially overestimating the amount of natural precipitation recharging the groundwater basins in these two valleys. As noted in the NPS's March 29, 2011 scoping comments letter to this EIR, this is the same trend that was observed with the former Cadiz Project back in the early 2000s and is counter to most of the realistic recharge estimates presented by other studies in the area. The NPS's concern is best demonstrated by a comparison of recharge (and discharge) estimates from past and current Cadiz Project investigators with recharge estimates from other independent investigators presented in

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hydrographic basins (USGS, Harrill and Prudic, 1998, Prof Paper 1409-A). Groundwater discharge by evapotranspiration from the floor of Death Valley, the terminal discharge from the Death Valley Regional Groundwater Flow System, was estimated by the USGS at approximately 35,000 AFY (DeMeo and others, 2003, Water Resources Investigation Report 2003-4254). By comparison, the drainage area of the four Cadiz project watershed(s) totals 2,320 square miles, which is a much smaller drainage area than the Death Valley system. All else equal, the contributing area to the Death Valley Regional Groundwater Flow System is roughly 7 times larger than the contributing area to the Cadiz Project, suggesting that the annual recharge (and discharge) from the Project area should be on the order of 5,000 AFY.

The project proponent's estimates of the annual recharge (and discharge) for the Cadiz project watershed in the range of 30,000 AFY are not reasonable and should not even be considered.

The recharge estimates provided in 2000 by the USGS in its technical review of the former Cadiz Project, which were computed by a variety of methods, ranged from 2,000 – 10,000 AFY. These values, computed by a scientific agency with no financial stake in the proposed project, peer-reviewed and made available to the public, provide a reasonable range of recharge estimates for the Project area. This range of values should be used to guide evaluation of the proposed Cadiz Project.

ISSUE #2: It is inappropriate to conclude "a priori" that all springs in the watershed area are hydraulically discontinuous with the target aquifer. The SMWD presents a brief reconnaissance study in the Draft EIR of potential effects on springs and seeps from groundwater pumping by the Project concluding, unsurprisingly, that springs are not connected to the target aquifer and thus will be unaffected by the Project. Available evidence indicates that some springs within Mojave National Preserve likely are hydraulically continuous with the aquifer that is the target of the subject groundwater development, and that other springs within the Preserve likely are not hydraulically continuous with this aquifer. In the absence of more conclusive, site-specific studies, it would be inappropriate to conclude "a priori" that all springs in the area are hydraulically discontinuous with the target aquifer. To resolve this uncertainty, the NPS requests that a study of selected springs within Mojave National Preserve be a component of any proposed Monitoring and Management Plan.

ISSUE #3: An alternative Project scenario limiting pumping in the watersheds to the perennial yield amount would likely increase the conservation efficiency of the Project, decrease adverse impacts in the project watersheds, and allow Cadiz to achieve many of their Project objectives and "Green Compact" stewardship principles. Pumping in excess of the perennial yield of the basin under the currently proposed project pumping scenarios increasingly exacerbates mining of groundwater, as evidenced by the three pumping schemes that were simulated. Capture of groundwater that is ultimately destined for the dry lake areas could likely be achieved through a less aggressive pumping scheme that would not withdraw groundwater in excess of the perennial yield of the basin, and if the current objective of trying to

maximize the retrieval of fresh groundwater that is already down-gradient of the proposed wellfield is abandoned.

ISSUE #4: The hydrologic analysis in the Draft EIR is technically deficient with respect to constraining the Project recharge estimate through physical measurement and quantification of groundwater discharge from the playa areas. Data are presented that indicate extensive evaporation from the playa is unlikely, including reports of water depths beneath Bristol Dry Lake ranging from 8 to 35 feet, which would require an unrealistic capillary rise to support a discharge of 32,000 AFY. The NPS demonstrates through extrapolation of results from a USGS study of groundwater discharge rates in Death Valley (which compensates for the effect of surface water runoff to soil evaporation) that total groundwater discharge from the dry lakes (and therefore, recharge to the Project area) is probably on the order of 4,650 to 7,750 AFY at best. This estimated range falls within the range of recharge (2,000 to 10,000 AFY) provided by the USGS in 2000. As noted in the NPS's March 29, 2011 scoping comments letter to this EIR, estimates of groundwater discharge need to be verified through physical measurements of soil evaporation at the dry lake sites and groundwater levels beneath the dry lakes. Quantification of water loss off of these two dry lakes is extremely important - this is the limiting factor on the amount of recharge entering the flow system and how much recoverable water is available for the project. If it is shown that the amount of soil evaporation occurring at the dry lake areas is small or negligible, then the Project's claim to being sustainable must be rejected.

ISSUE #5: The distributed parameter watershed model INFIL3.0 likely is over-estimating recharge in the Project watersheds. Based on a recent USGS study near Joshua Tree, CA that utilized an earlier version of the INFIL3.0 distributed-parameter watershed model, a numerical flow model and several supporting field techniques, coupled with the Cadiz Project's over-reliance on the INFIL3.0 watershed model results without additional supporting field data to constrain the recharge estimates, it is likely that the Cadiz project's recharge estimates using INFIL3.0 could be larger than the true recharge by a factor of 2 to 10 times. The NPS also suspects that the Fenner Basin watershed model may be under-estimating the amount of evapotranspiration and surface water runoff occurring in the basin, all of which contributes to an over-estimation of the amount of water infiltrating past the root zone.

ISSUE #6: The ability of the numerical groundwater flow model to accurately simulate groundwater discharge by evapotranspiration is questionable. Model water balance results suggest that the model is not producing annual volumes of evapotranspiration discharge equivalent to the amounts of recharge going into the model. The NPS estimates that the model is only discharging 76% of the 32,000 AFY of recharge going into the model. The NPS is also concerned with how the model estimates evapotranspiration discharge, when the existing pre-pumping depth to water (18 feet) beneath Bristol Dry Lake already exceeded the extinction depth of 15 feet prior to simulating any of the pumping/recharge scenarios. The USGS has also shown in a study from nearby China Lake that the annual rate of evaporation from bare soil decreased to

negligible amounts at water-level depths of more than 7 feet below land surface, thus calling into question the validity of the extinction depth established for the model.

ISSUE #7: The SMWD has failed to adequately consider inclusion of monitoring and mitigation measures developed under the earlier Cadiz Project, and to adequately demonstrate the effectiveness of certain current mitigation measures proposed to address pumping-related impacts. As noted in the NPS's March 29, 2011 scoping comments letter to this EIR, the SMWD should consider the relevancy of the mitigation measures that were developed and proposed under the former Cadiz Project and determine which measures might have utility to this EIR. The NPS recommends that the principal features of that plan be adopted, including a participatory role for the potentially affected parties (like the NPS), establishment of an array of "early-warning" monitoring wells between the proposed project pumping and Mojave National Preserve, and "action criteria" to trigger consideration of mitigation measures as effects are observed over time. With all the inherent uncertainty that exists on groundwater projects such as this, it is imperative that the project proponent practice adaptive management of their project, with coordination and input from their neighbors, the potentially affected parties.

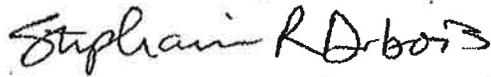
Additionally, the NPS is not convinced that the SMWD has sufficiently demonstrated the effectiveness of several key mitigation measures to be able to conclude that the direct and cumulative impacts to groundwater and surface water resources would be less than significant with mitigation and would not be cumulatively considerable. The SMWD needs to better demonstrate and discuss the potential effectiveness of these important corrective measures in the EIR document using existing and/or additional groundwater modeling simulations that test these corrective measures.

CONCLUSIONS

While the NPS is concerned about the SMWD's broad characterization of natural evapotranspiration processes as "wasted water," we are not averse to the concept of recovering groundwater that naturally discharges to the atmosphere if it is not destructive of natural ecosystems, nor are we averse to the concept of using an aquifer to store surplus surface water supplies and extracting these stored supplies during dry years, as long as (1) the Project adopts and adheres to a hydrologic sustainable yield concept, and (2) the Project does not directly or indirectly affect water resources, water-dependent resources, and other natural and cultural resources within NPS park units. Based on several deficiencies with the current analysis presented in the Draft EIR, the NPS recommends that additional refinements be made in the Final EIR that provide a more accurate representation and evaluation of the groundwater flow system, the affected environment, and the effectiveness of proposed mitigation measures. Much of this can be accomplished using additional scientific methods to better constrain the recharge estimate of the study area. Until these refinements are made, the NPS is not confident concluding that the proposed Cadiz Project is sustainable and protective of park resources.

Thank you for the opportunity to provide comments on this Draft EIR. For any clarification or follow up regarding our comments, please contact Debra Hughson, Science Advisor, Mojave National Preserve at (760) 252-6105.

Sincerely,

Handwritten signature of Stephanie R. Dubois in cursive script.

Stephanie R. Dubois
Superintendent

cc:

PWRO-REC per Alan Schmierer
Bill Hansen - WRD
Bill Van Liew - WRD
Gary Karst - PWR
Debra Hughson - MOJA



United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Office of the Director
Reston, Virginia 20192

In Reply Refer To:
Mail Stop 100
#20020106

JAN 15 2002

Honorable Dianna Feinstein
United States Senate
Washington, D.C. 20510

RECEIVED
JAN 15 2002
Action: _____

Dear Senator Feinstein:

Thank you for your letter of December 21, 2001, in which you discuss concerns about the Cadiz Project and possible assistance the USGS could provide.

I am sure that by now you have heard many discussions concerning the uncertainties associated with ground water recharge rates. Currently, we believe the recharge rate is less than 5,000 acre-feet per year. Reconciling disparities in recharge rate estimates can be achieved only through detailed regional and local studies over an extended period of time. However, given the urgency of the need to make rational decisions fairly quickly, the Cadiz Project managers have proposed a monitoring and management plan that contains stipulations that can result in the Project's being closed down should the monitoring data reflect the need to do so. Our scientists most knowledgeable about this Project are confident that this monitoring and management plan will be an effective tool to assess the status in the ground water and provide the information necessary to protect the regional ground water resources.

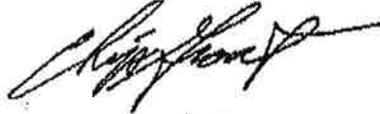
We appreciate the confidence shown in the USGS by your request. However, while it is appropriate for us to conduct the monitoring programs, we believe that the day-to-day management authority should remain with the Bureau of Land Management (BLM). As a sister bureau in the Department of the Interior (DOI), and with integral land management responsibilities, we are confident that the BLM senior managers would take appropriate action should monitoring data develop a picture that warrants adjustments in or closing of the Project.

Honorable Dianne Feinstein

2

As you know, the USGS has participated in a number of discussions among the affected DOI bureaus, stakeholders, and your staff. We look forward to continuing these discussions. Should you or your staff need further information, please contact me on 705-648-7411 or Mike Shulters, California District Chief, on 916-278-3026.

Sincerely,



Charles G. Groat
Director



State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Director's Office
P.O. Box 944209
Sacramento, CA 94244-2090
www.wildlife.ca.gov

EDMUND G. BROWN JR., Governor
CHARLTON H. BONHAM, Director



December 4, 2018

Scott S. Slater
Chief Executive Officer
Cadiz, Inc.
550 South Hope Street
Los Angeles, CA 90071

Dear Mr. Slater:

INFORMATION REGARDING NEW SIGNIFICANT OR SUBSTANTIALLY MORE SEVERE IMPACTS TO FISH AND WILDLIFE RESOURCES FROM THE CADIZ VALLEY WATER CONSERVATION, RECOVERY, AND STORAGE PROJECT

On April 26, 2017, California Department of Fish and Wildlife (Department) staff attended a call with consultants and representatives for the Cadiz Valley Water Conservation, Recovery, and Storage Project (Project) intended to introduce the Project to Department staff and discuss the anticipated Project notification under the lake and streambed alteration (LSA) program. (Fish & G. Code, §§ 1600-1617.) The Department previously provided comments on the draft Environmental Impact Report (EIR) for the Project in February 2012. (SCH No. 2011031002.) In anticipation of the Project LSA notification, the Department began re-familiarizing itself with the Project EIR certified by the CEQA lead agency Santa Margarita Water District (District) and other related material. In the course of its review, the Department identified information of substantial importance that was developed after the District certified the Project EIR. This new information indicates the Project may cause significant effects not discussed or substantially more severe effects than shown in the Project EIR.

Specifically, new information demonstrates a hydrologic connection between the aquifer underlying the Project pumping site and nearby Bonanza Spring. The Department began installing GPS collars on desert bighorn sheep in the area of the Project in 2013 and this data indicates these legally-protected sheep utilize the spring. Further analysis and additional review of these effects will be necessary for the Department to evaluate the anticipated LSA notification, to consider and take appropriate action in response under the Fish and Game Code, and to fulfill its public trust responsibility for California fish and wildlife and the habitat on which they depend.

BACKGROUND

Project representatives indicated to the Department that the Project's proposed 43-mile water conveyance pipeline will involve 67 streambed crossings. This large proposed Project would trigger the Department's jurisdiction and require an LSA agreement. Based on the earlier discussion with the Project representatives, the Department expects notification under Fish and Game Code section 1602 for Project streambed crossings.

The Department is California's designated trustee agency for fish and wildlife resources. (Fish & G. Code, § 1802.) The public trust doctrine encompasses the protection of wildlife and the Department must take its public trust responsibilities into account when exercising its mandate under the Fish and Game Code. (*Center for Biological Diversity v. Dept. of Forestry and Fire Protection* (2014) 232 Cal.App.4th 931, 952, 953.) The Department's area of expertise for purposes of the California Environmental Quality Act (CEQA) includes fish and wildlife, endangered species, and hydrologic conditions. (Pub. Resources Code, § 21104.2; Cal. Code Regs., tit. 14, § 15386 & ch. 3, Appen. B.) The Department is also a responsible agency under CEQA if a project requires the Department's discretionary approval, such as for an incidental take permit under the California Endangered Species Act or, as here, an LSA agreement under Fish and Game Code sections 1600-1617. (Cal. Code Regs., tit. 14, § 15381.)

The Department appreciates the District as CEQA lead agency certified the Project EIR on July 31, 2012; that the District drew related litigation; and that those challenges have run their course. (See, e.g., *Center for Biological Diversity v. County of San Bernardino* (4th Dist. 2016) 247 Cal.App.4th 326.) With that, the Project EIR stands as certified and the Project EIR is presumed adequate as a matter of law. (*Laurel Heights Improvement Assn. v. Regents of the Univ. of Cal.* (1993) 6 Cal.4th 1112, 1130.) Finally, the Department appreciates that, with the presumption of legal adequacy attached to the Project EIR, subsequent or supplemental environmental review is disfavored and is the exception to the rule under Public Resources Code section 21166. Indeed, a responsible agency may only determine subsequent or supplemental review is necessary in limited circumstances. (Cal. Code Regs., tit. 14, §§ 15096, 15162-15164.) One such circumstance exists where new information of substantial importance shows a project will have a significant effect not discussed in the certified EIR or that significant effects previously examined in the EIR will be substantially more severe. (*Id.*, § 15162, subd. (a)(3).) This may likely be the case here.

NEW INFORMATION SUBSEQUENT TO THE CERTIFIED PROJECT EIR

Numerous technical and scientific hydrological studies, reports, and analyses informed the Project and its environmental analysis prior to the District's certification of the Project EIR. Project EIR section 4.9 describes several of these studies and Project EIR Appendix H compiles many of them.

In its review of Project information in preparation for the Project LSA notification, the Department identified additional data and reports developed or released since Project EIR certification and relevant to the Project. They include but are not limited to the following: Aquilogic, Inc., Review of the Groundwater Hydrology of the Cadiz Project, San Bernardino County, California (October 2013); Andy Zdon & Associates, Inc., Mojave Desert Springs and Waterholes: Results of the 2015-16 Mojave Desert Spring Survey, Inyo, Kern, San Bernardino and Los Angeles Counties, California (November 11, 2016); T.P. Rose, Data Measured on Water Collected from Eastern Mojave Desert, California (August 18, 2017) LLNL-TR-737159; Kenny GeoScience and TLF Consulting,

Inc., Updated Assessment of Cadiz Water Project's Potential Impacts to Bonanza Springs (January 2018); Andy Zdon et al., *Understanding the Source of Water for Selected Springs Within Mojave Trails National Monument, California*, Environmental Forensics, Vol. 19, No. 2 (2018), pp. 99-111; and Adam Love and Andy Zdon, *Use of Radiocarbon Ages to Narrow Groundwater Recharge Estimates in the Southeastern Mojave Desert, USA*, Hydrology, Vol. 5, No. 3 (2018). In addition, the Department began installing GPS collars on desert bighorn sheep (*Ovis canadensis nelsoni*) in the area of the Project in 2013. The Department has collected extensive GPS data on the species' movement and use of springs, including Bonanza Spring.

The Project EIR considered the connection between the groundwater aquifer underlying the Project wellfield and nearby springs and concluded the springs were hydrologically disconnected from the groundwater aquifer. (Project EIR, p. 4.9-19.) The Project EIR identified impacts to desert bighorn sheep to be less than significant. (Project EIR, pp. 4.4-43, 44, 45, 48, 52, 58.) The new information available in recent technical reports, however, demonstrate a hydrologic connection between the aquifer underlying the Project pumping site and nearby Bonanza Spring. The recently collected GPS collar data indicate that desert bighorn sheep utilize Bonanza Spring. Based on the Department's review of this new information, the Department believes the Project EIR would not be adequate for the Department's use, as a CEQA responsible agency and the public trustee for wildlife, for regulatory approval of a Project LSA agreement.

BONANZA SPRING CONNECTION TO WELLFIELD GROUNDWATER

The new reports provide information about the connection between the Project wellfield aquifer and Bonanza Spring that was not known at the time of the Project EIR. Multiple reports are the result of 2015 and 2016 surveys and sampling data from springs in the Mojave Desert. The surveys included springs near the Project, such as Theresa Spring in the Marble Mountains and Bonanza Spring in the Clipper Mountains. The researchers collected, tested, and analyzed water samples and developed and investigated new data regarding water temperatures, chemical signatures, and stable isotopes deuterium, oxygen-18, and tritium.

Analysis of the newly collected data indicates that Bonanza Spring is not solely locally sourced from a perched aquifer; this is contrary to the conclusion of the Project EIR that there is no hydraulic continuity between area springs and the regional groundwater table. Bonanza Spring is located in a 50-acre watershed and its flow has remained consistent over periodic measurements since 1929, even during drought periods. Measured spring temperatures are 11.5 degrees Fahrenheit warmer than the average annual ambient air temperature, indicating that the spring water traveled from significant depth.

The isotopic composition of springs in the Mojave Desert that arise from locally sourced or perched aquifers generally reflect the same isotopic values as local precipitation. The reports document, however, that deuterium and oxygen-18 isotope values at Bonanza

Spring do not correlate with local precipitation values or with values at other nearby springs. Instead, the values indicate a source water that emanates from a higher elevation such as that found in the Providence Mountains north of the Clipper Mountains.

The new information also includes results from tritium testing water samples from Bonanza Spring. Tritium is incorporated into precipitation water molecules and, because of its intense production during atmospheric thermonuclear tests from 1951 to 1980, can be detected in springs dependent on local precipitation or modern groundwater. The water samples from Bonanza Spring had non-detect tritium values, indicating the source water for this spring is pre-1952 origin consistent with a deeper groundwater source.

In addition to the recent data and reports establishing that Bonanza Spring is fed from a deep regional aquifer rather than a local perched aquifer, chemical and isotopic analyses of groundwater from the Project area and from Bonanza Spring show that Bonanza Spring is connected to groundwater in the Fenner Valley where the Project wellfield is located. The spring and the wellfield share a similar Na-HCO₃ chemical composition. Bonanza Spring also has the same deuterium composition as a groundwater well located near the Project wellfield. Precipitation in the higher-elevation Providence Mountains shares isotope values with Bonanza Spring and the Fenner Valley alluvial aquifer. Together, the hydrologic characteristics and the isotopic and geochemical data for Bonanza Spring and other nearby groundwater sources demonstrate that Bonanza Spring and Fenner Valley groundwater underlying the Project wellfield rely on the same precipitation source and are hydraulically connected.

In addition to the new hydrological reports, the Department has collected new GPS data since certification of the Project EIR on desert bighorn sheep and their use of certain areas, including Bonanza Spring. The Department as part of its wildlife management and monitoring efforts has been intensively collaring and tracking desert bighorn sheep in the Mojave Desert since 2013. The GPS collar data indicate that individual bighorn sheep frequent Bonanza Spring.

NEW INFORMATION AND RELATED ENVIRONMENTAL EFFECTS

As mentioned above, the Project EIR discusses potential impacts to springs in nearby mountain ranges, including Bonanza Spring. (Project EIR, pp. 4.9-19, 22, 59, 60, 61.) Based on previous assessments, the Project EIR stated that there was no hydraulic connection between mountain springs in the Project watersheds and the groundwater underlying the Project wellfield. (Project EIR, pp. 4.9-19, 61.) According to the Project EIR, these springs "derive their water from precipitation in the higher elevation mountains, not groundwater from the alluvial aquifer." (Project EIR, p. 4.9-59; see also Project EIR, pp. 19, 21, figure 4.9-4.)

The Project EIR considered a technical memorandum that evaluated two conceptual models for Bonanza Spring. (Project EIR, p. 4.9-59.) Both of these conceptual models

assumed that the spring's source water was from mountain precipitation that infiltrated into the ground and traveled to the springs. (Project EIR, p. 4.9-59.) According to the Project EIR, "[t]here is *no information* that suggests these springs are a result of any other source of water, such as deeply circulating groundwater, confined groundwater, or other similar mechanisms attributable to spring formation." (Project EIR, p. 4.9-59 (emphasis added).) As a result of assuming that the springs, including Bonanza Spring, share no hydraulic connection with the groundwater aquifer where Project pumping would occur, the Project EIR concluded the Project would have no impact on springs. (Project EIR, p. 4.9-60.)

The Project EIR alternatively considered as a hypothetical condition a hydraulic connection between groundwater feeding the springs and the aquifer, but adopted a mitigation measure that was based on the opposite assumption that there is no connectivity. (Project EIR, p. 4.9-60, Appen. B2, pp. 2, 3.) To mitigate any potential impact to less than significant, the Project EIR incorporates a monitoring protocol for Bonanza Spring as an indicator spring. (Project EIR, p. 4.9-60, Appen. B2, pp. 2, 3.) However, this monitoring protocol was based on the assumption that the nearby springs rely on rainfall recharge of shallow fractured bedrock and are not dependent on the aquifer underlying the wellsite. (Project EIR, Appen. B2, pp. 2, 3.) The Project EIR's hypothetical assessment led to the conclusion that the Project would have a less than significant impact on the springs. (Project EIR, p. 4.9-60.)

Bighorn sheep are a fully protected mammal under the Fish and Game Code section 4700 and take of this species is generally prohibited. The Project EIR states that adjacent and surrounding mountain ranges provide suitable habitat for desert bighorn sheep and that the Project may affect the species' habitat. (Project EIR, pp. 4.4-14, 24, 25.) The Project EIR notes that desert bighorn sheep movement through corridors near the Project could be temporarily affected by construction activities, but that no significant impact to wildlife movement would occur. (Project EIR, pp. 4.4-43, 44, 45, 52, 58.) The Project EIR states that man-made watering features in the area would not be impacted. (Project EIR, p. 4.4-43.) It also recognizes that man-made features and natural springs provide watering holes for desert bighorn sheep. (Project EIR, p. 4.9-19.)

The Project EIR indicated that any impact to desert bighorn sheep would be less than significant. The Project EIR did not map the species' occupied range in the Clipper Mountains where Bonanza Spring is located. Further, the Project EIR does not discuss potentially significant effects to the desert bighorn sheep from the Project pumping Fenner Valley groundwater hydraulically connected to Bonanza Spring. Since certification of the EIR, information from the recent hydrological reports and desert bighorn sheep GPS collar data raise the specter that impacts to this species may be substantially more severe than the Project EIR discussed.

Scott Slater, Chief Executive Officer
Cadiz, Inc.
December 4, 2018
Page 6

In short, the best available science regarding the Project and its potentially significant impacts to nearby Bonanza Spring and desert bighorn sheep has progressed since the District certified the Project EIR. The new information available to the Department does not arise from a single source, but is an accumulation of information from various sources over the past several years. The information from isotopic and chemical analyses of water samples demonstrates a previously unknown connection between the groundwater underlying the Project wellfield and Bonanza Spring. While the Project EIR and the monitoring protocol assumed that Bonanza Spring was hydraulically disconnected from groundwater, subsequent reports demonstrate that Bonanza Spring is connected to the aquifer underlying the Project wellfield. Based on this new information, the Project's groundwater source is now seen to be connected to the spring, raising the potential of a substantially increased risk of negative impacts to the desert bighorn sheep that frequent Bonanza Spring.

CONCLUSION

The Department began its review of Project-related materials and other new information in anticipation of the LSA notification for the Project. As part of its effort to date the Department has identified new information of substantial importance concerning the Project's more direct connection to, and potential impact on, Bonanza Spring and desert bighorn sheep than previously analyzed and disclosed in the Project EIR. Current information, including the hydrologic reports and the desert bighorn sheep GPS collar data described above, indicate the Project may pose a substantially higher risk to the spring and desert bighorn sheep than the Project EIR disclosed. Further analysis and additional review of these important issues will be necessary for the Department to evaluate the anticipated LSA notification, to consider and take appropriate action in response under the Fish and Game Code, and to fulfill the Department's public trust responsibility.

We look forward to further dialogue regarding this Project.

Sincerely,



Charlton H. Bonham
Director